Bolt Stress Monitor In photo, an engineer is using a new Ultrasonic Bolt Stress Monitor developed by NASA's Langley Research Center to determine whether a bolt is properly tightened. A highly accurate device, the monitor is an important tool in construction of such structures as pressure vessels, bridges and power plants, wherein precise measurement of the stress on a tightened bolt is critical. Overtightened or undertightened bolts can fail and cause serious industrial accidents or costly equipment break-downs.

There are a number of methods for measuring bolt stress. Most widely used and least costly is the torque wrench, which is inherently inaccurate; it does not take into account the friction between nut and bolt, which has an influence on stress. At the other end of the spectrum, there are accurate stress-measuring systems, but they are expensive and not portable.

The battery-powered Langley monitor fills a need; it is inexpensive, lightweight, portable and extremely accurate because it is not subject to friction error. Sound waves are transmitted to the bolt and a return signal is received. As the bolt is tightened, it undergoes changes in resonance due to stress, in the manner that a violin string changes tone when it is tightened. The monitor measures the changes in resonance and provides a reading of real stress on the bolt. The device, patented by NASA, has aroused wide interest and a number of firms have applied for licenses to produce it for the commercial market.